Fig. 1

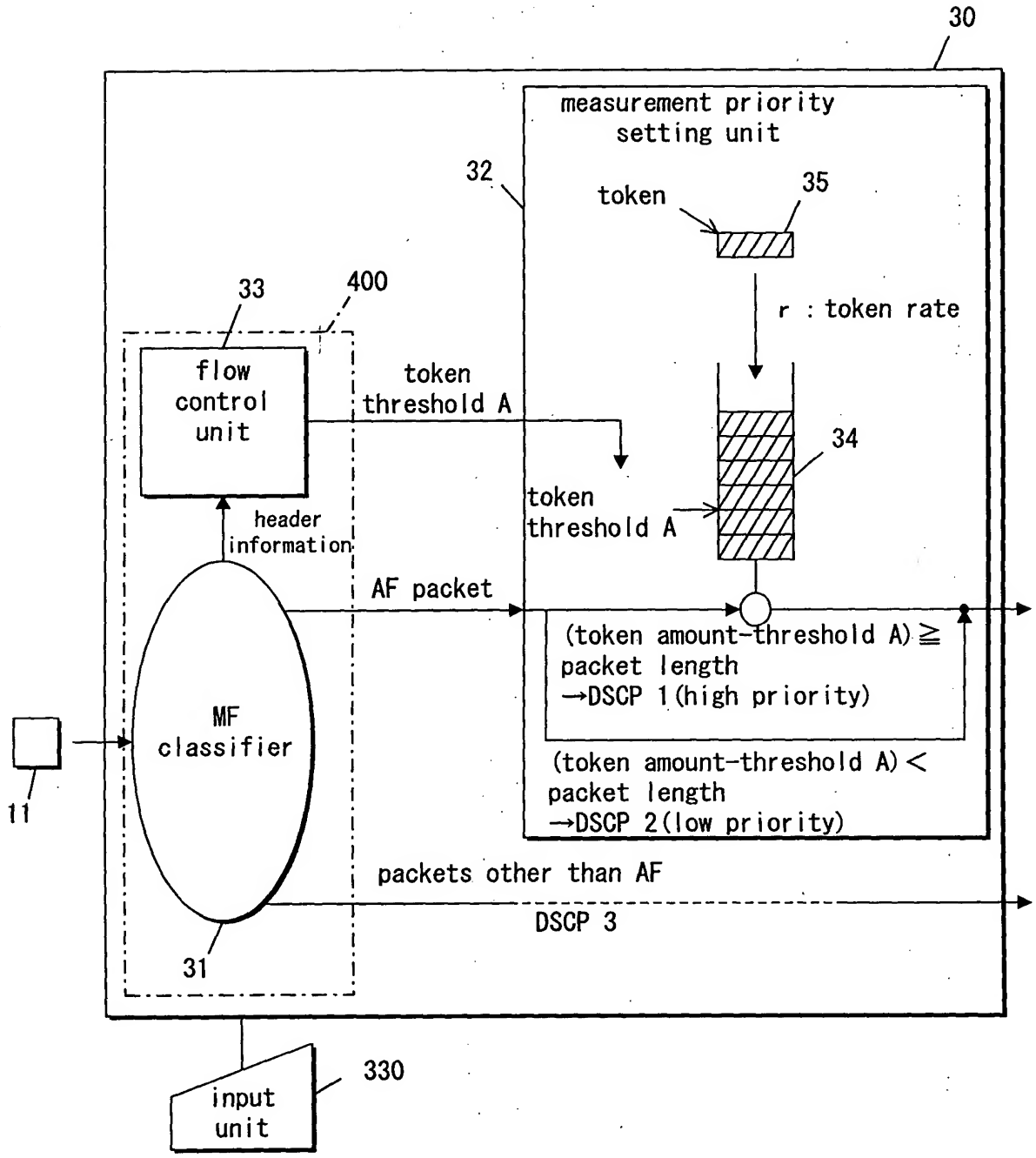

30
measurement priority setting unit
32
token
35
r : token rate
33
400
flow control unit
token threshold A
34
token threshold A
header information
AF packet
(token amount-threshold A)≧ packet length →DSCP 1(high priority)
(token amount-threshold A)< packet length →DSCP 2(low priority)
MF classifier
11
packets other than AF
DSCP 3
31
input unit
330

Fig. 2

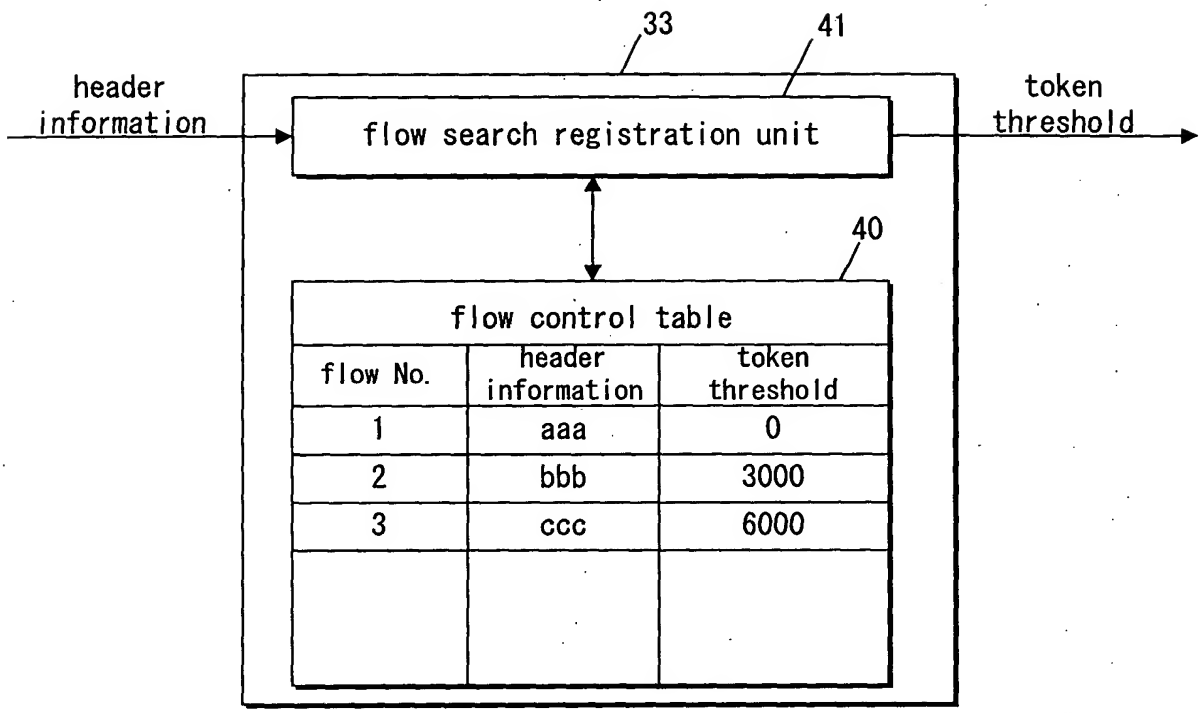

33
41
header information
flow search registration unit
token threshold
40
flow control table
flow No.
header information
token threshold
1
aaa
0
2
bbb
3000
3
ccc
6000

Fig. 3

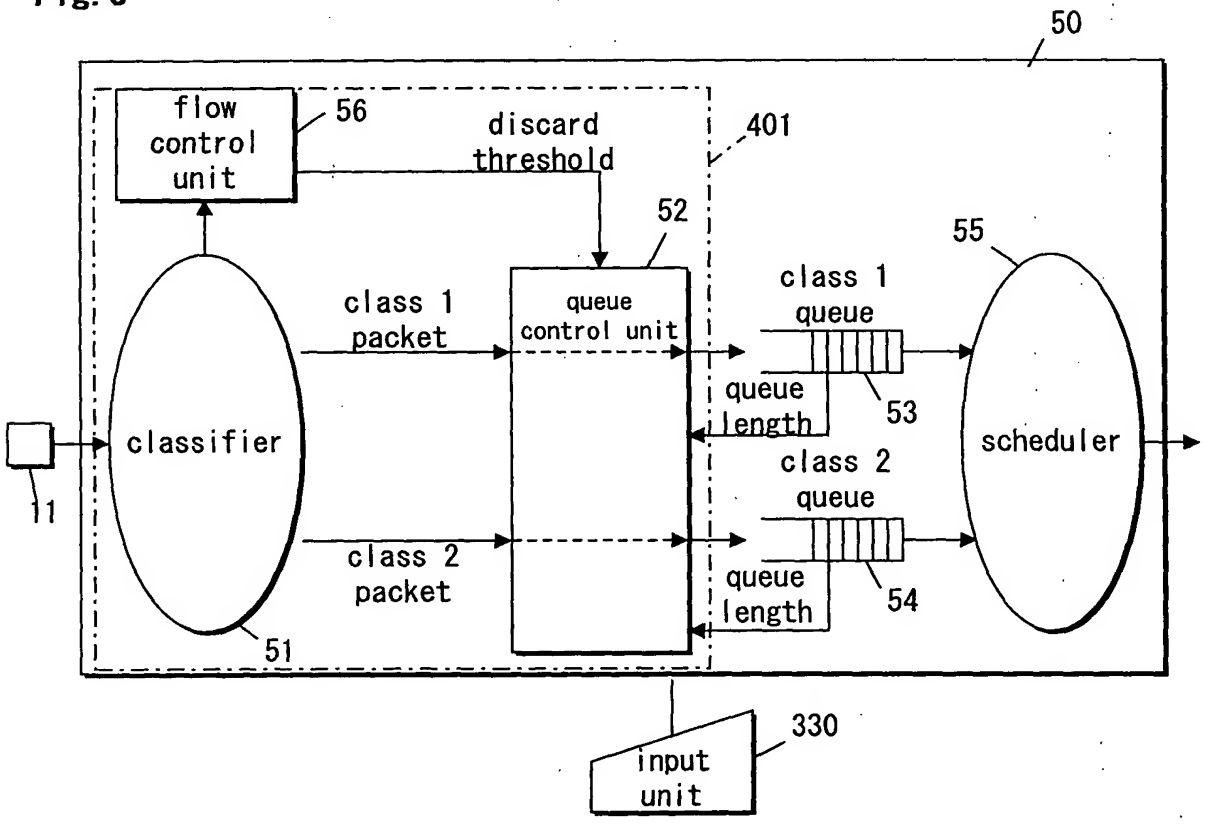

50
flow control unit
56
discard threshold
401
52
55
class 1 packet
queue control unit
class 1 queue
queue length
53
classifier
scheduler
class 2 queue
class 2 packet
queue length
54
11
51
330
input unit

Fig. 4

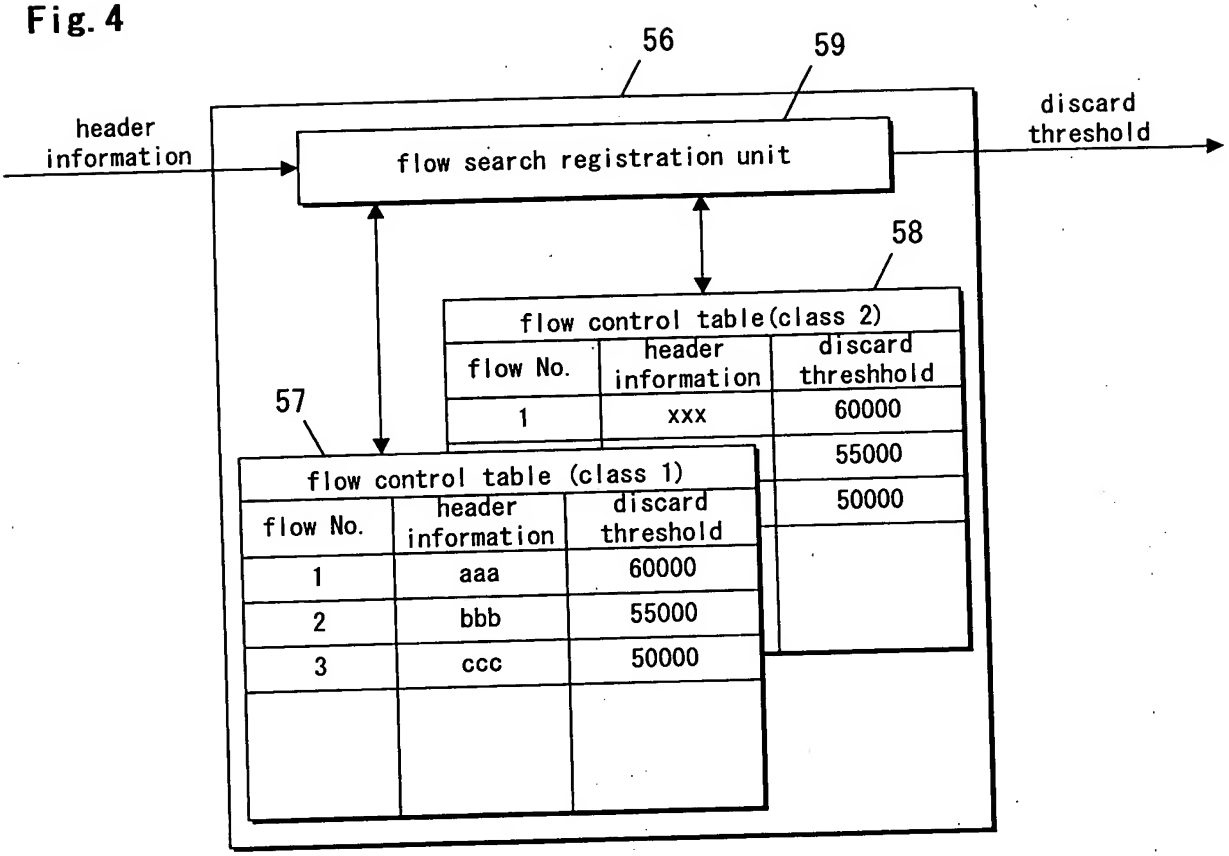

56
59
header information
flow search registration unit
discard threshold
58
flow control table(class 2)
flow No.
header information
discard threshhold
1
xxx
60000
55000
50000
57
flow control table (class 1)
flow No.
header information
discard threshold
1
aaa
60000
2
bbb
55000
3
ccc
50000

Fig. 5

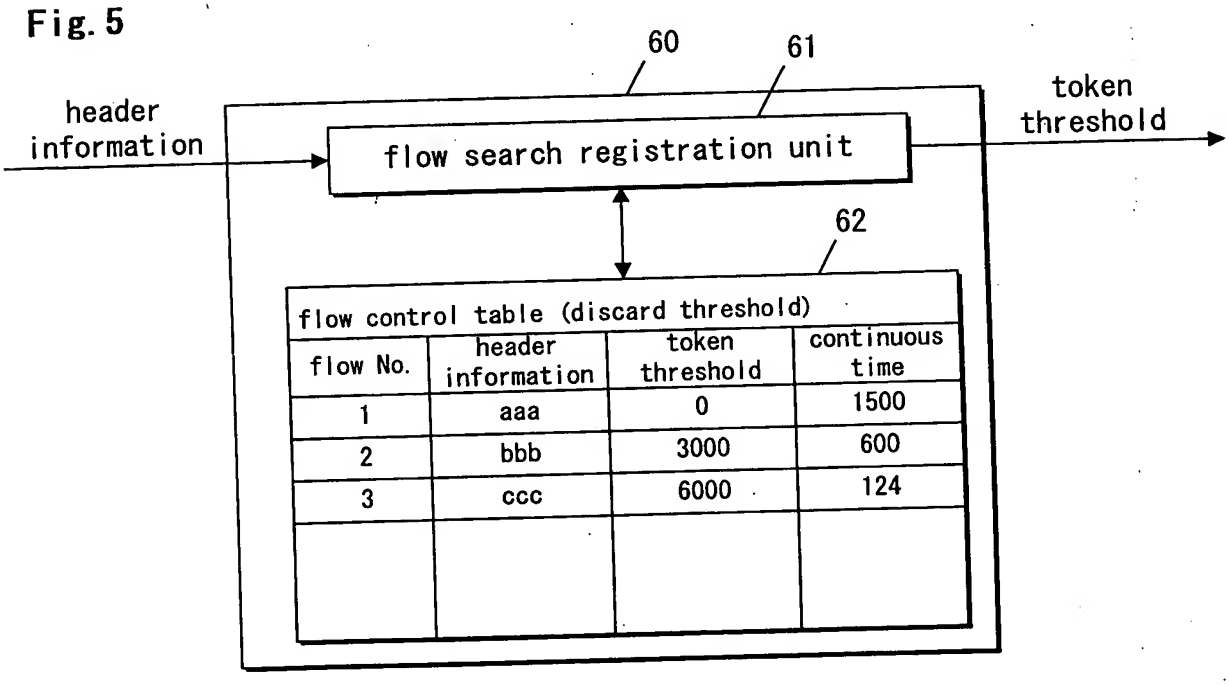
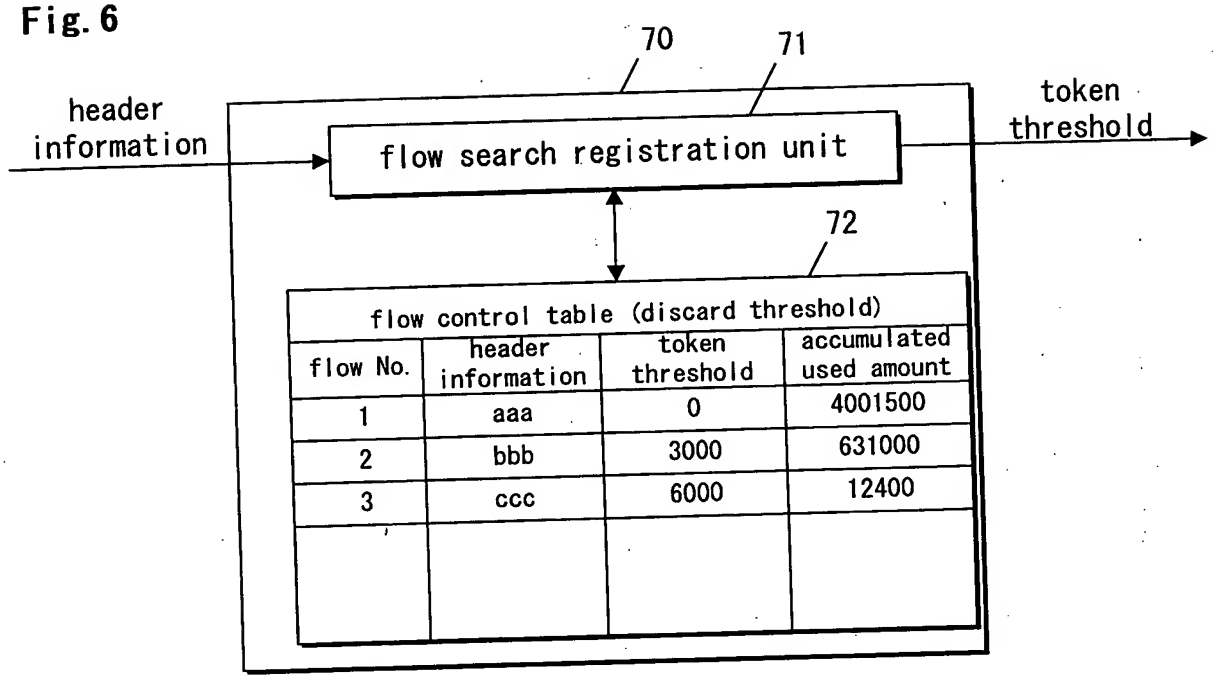

60
61
header information
flow search registration unit
token threshold
62
flow control table (discard threshold)
flow No.
header information
token threshold
continuous time
1
aaa
0
1500
2
bbb
3000
600
3
ccc
6000
124

Fig. 6



flow control table (discard threshold)

flow No.	header information	token threshold	accumulated used amount
1	aaa	0	4001500
2	bbb	3000	631000
3	ccc	6000	12400

Fig. 7

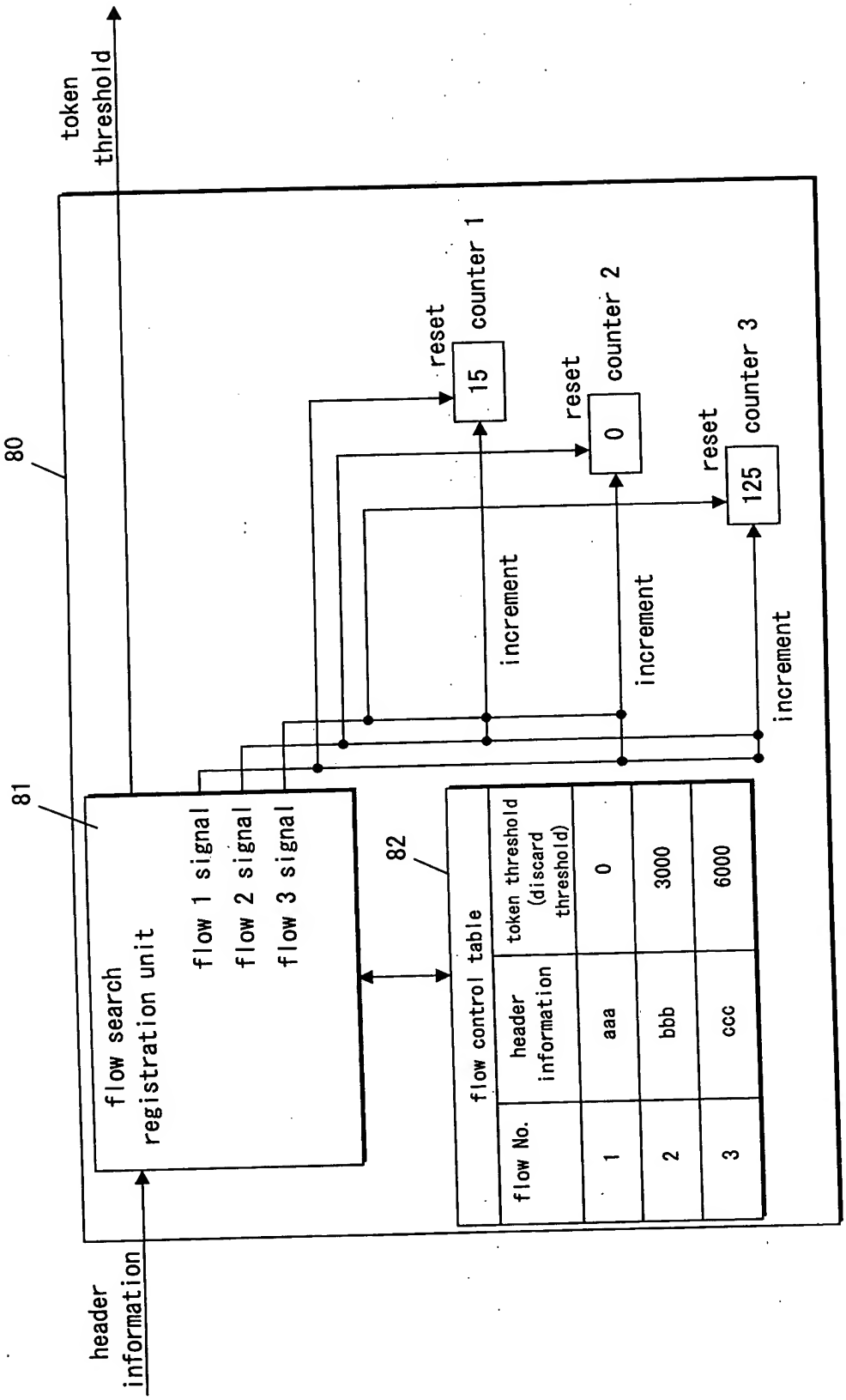

token threshold
80
81
flow search registration unit
flow 1 signal
flow 2 signal
flow 3 signal
header information
82
flow control table
flow No.
header information
token threshold (discard threshold)
1
aaa
0
2
bbb
3000
3
ccc
6000
reset
counter 1
15
reset
counter 2
0
reset
counter 3
125
increment
increment
increment

Fig. 8

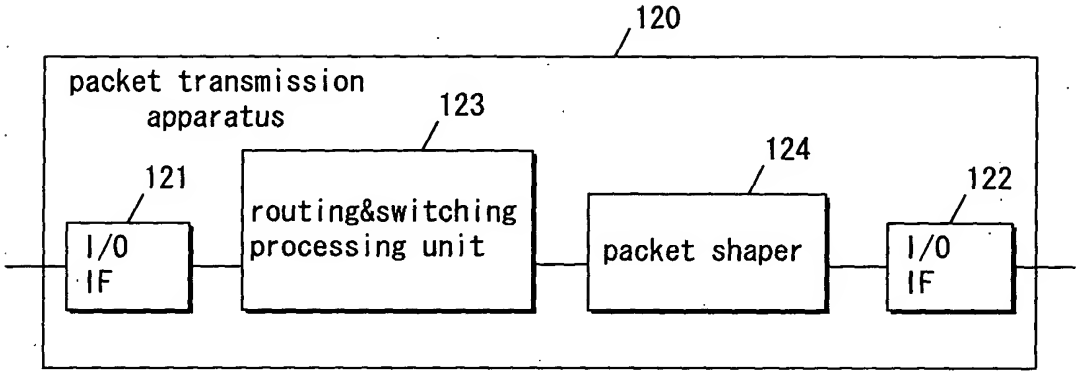

120
packet transmission apparatus
123
121
routing&switching processing unit
124
122
I/O IF
packet shaper
I/O IF

Fig. 9

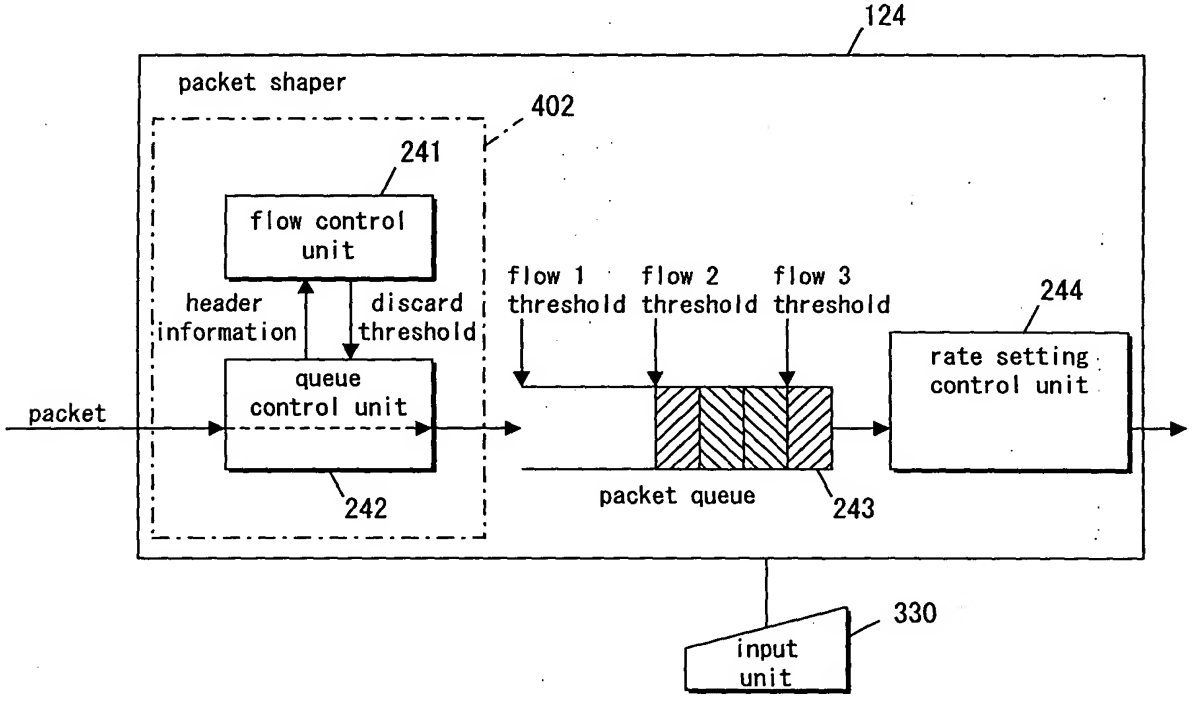

124
packet shaper
402
241
flow control unit
header information
discard threshold
queue control unit
packet
242
flow 1 threshold
flow 2 threshold
flow 3 threshold
packet queue
243
244
rate setting control unit
330
input unit

Fig. 10

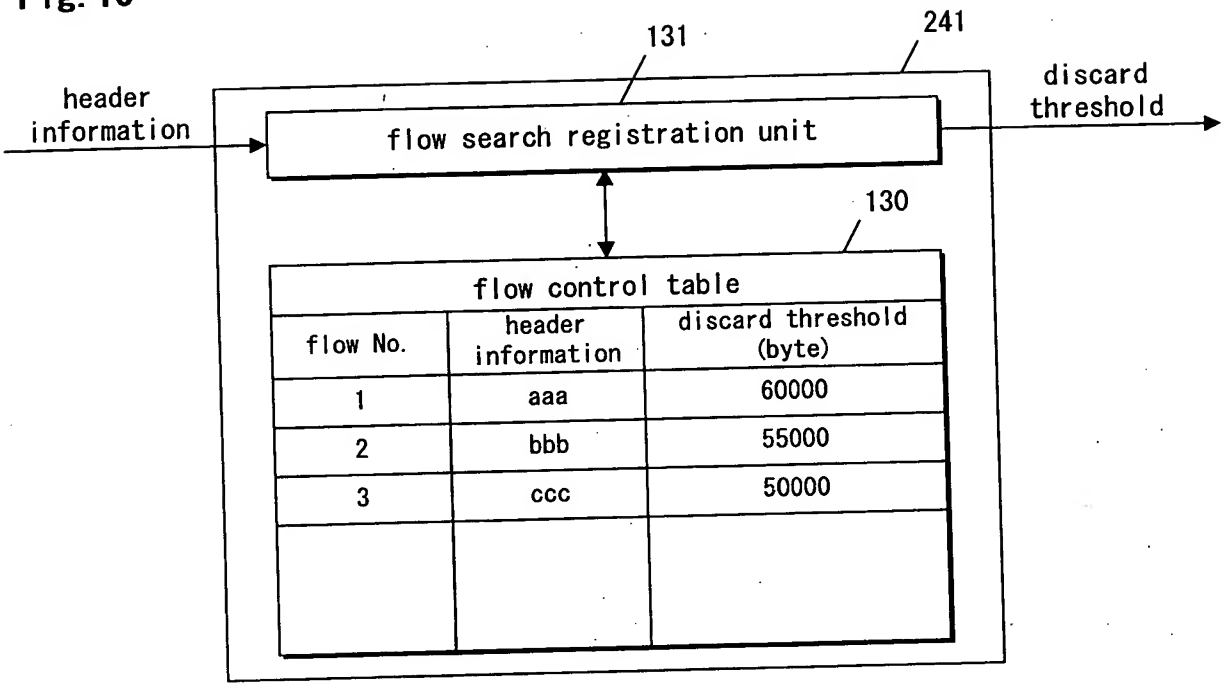

131
241
header information
flow search registration unit
discard threshold
130
flow control table
flow No.
header information
discard threshold (byte)
1
aaa
60000
2
bbb
55000
3
ccc
50000

Fig. 11

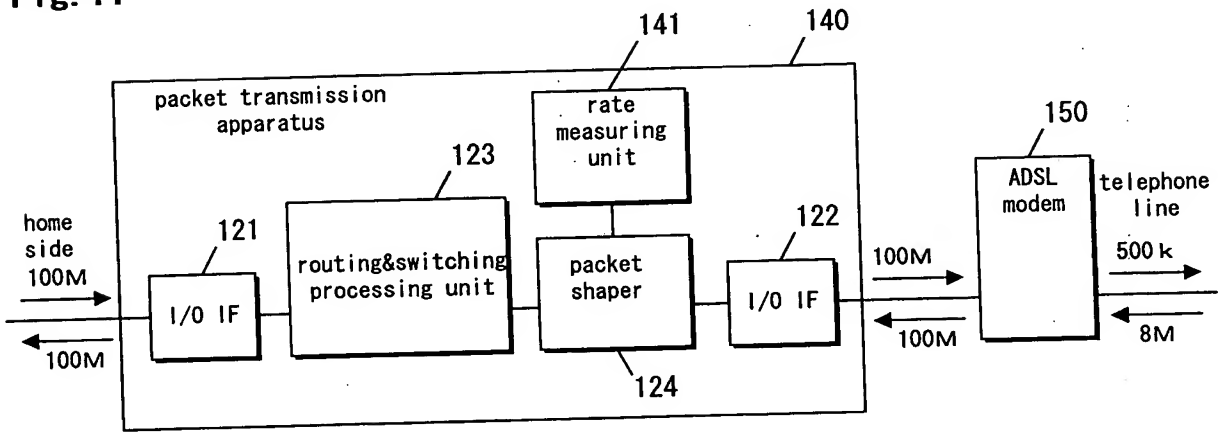

141
140
packet transmission apparatus
rate measuring unit
123
150
ADSL modem
telephone line
home side 100M
121
routing&switching processing unit
packet shaper
122
I/O IF
I/O IF
100M
500 k
100M
100M
8M
124

Fig. 12

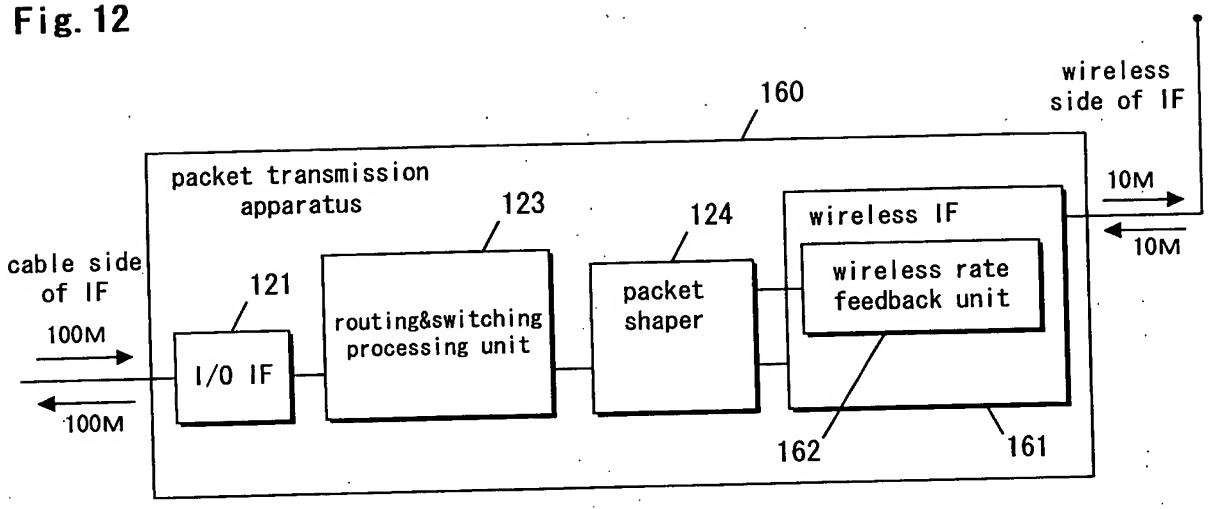

160
wireless side of IF
packet transmission apparatus
123
124
wireless IF
10M
10M
cable side of IF
121
routing&switching processing unit
packet shaper
wireless rate feedback unit
100M
I/O IF
100M
162
161

Fig. 13

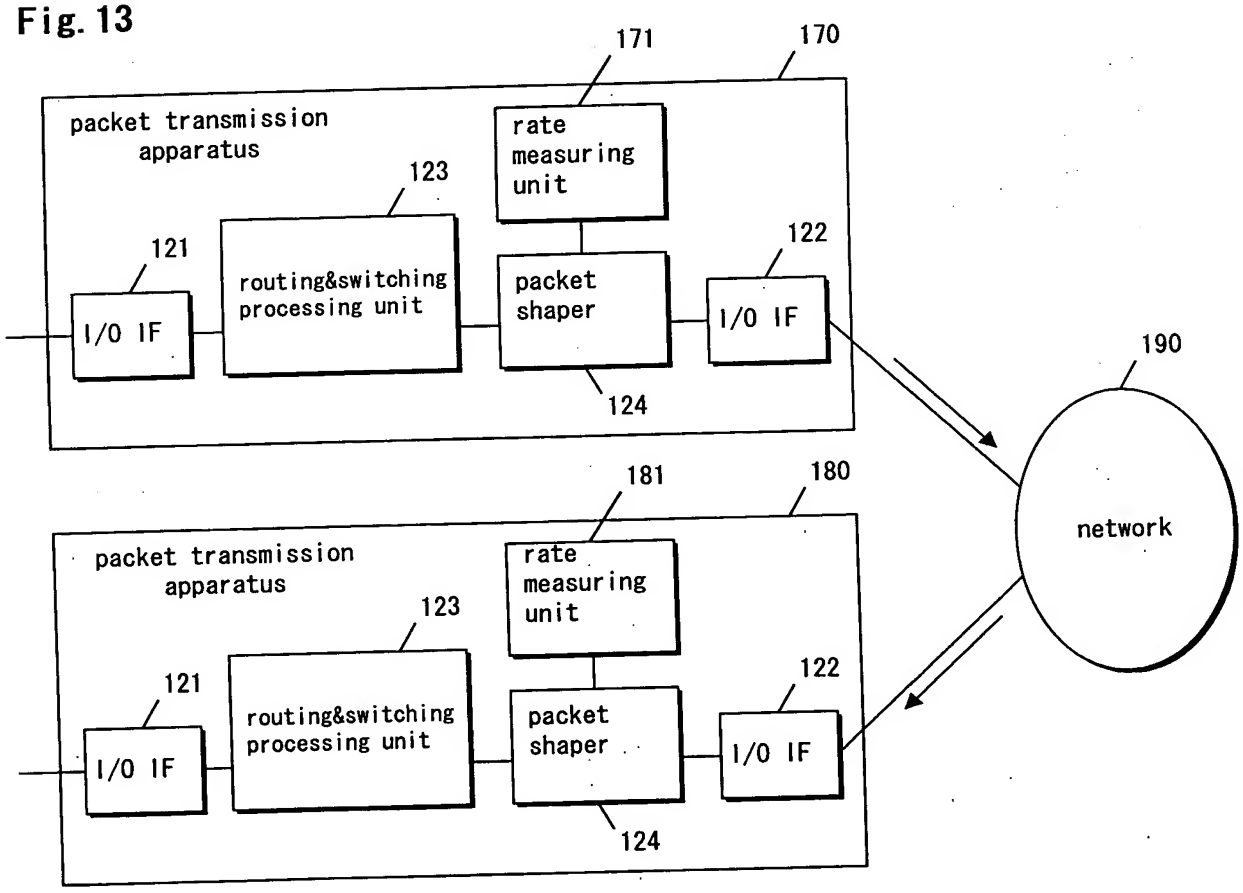

171
170
packet transmission apparatus
rate measuring unit
123
121
routing&switching processing unit
packet shaper
122
I/O IF
I/O IF
190
124
181
180
network
packet transmission apparatus
rate measuring unit
123
121
routing&switching processing unit
packet shaper
122
I/O IF
I/O IF
124

Fig. 14

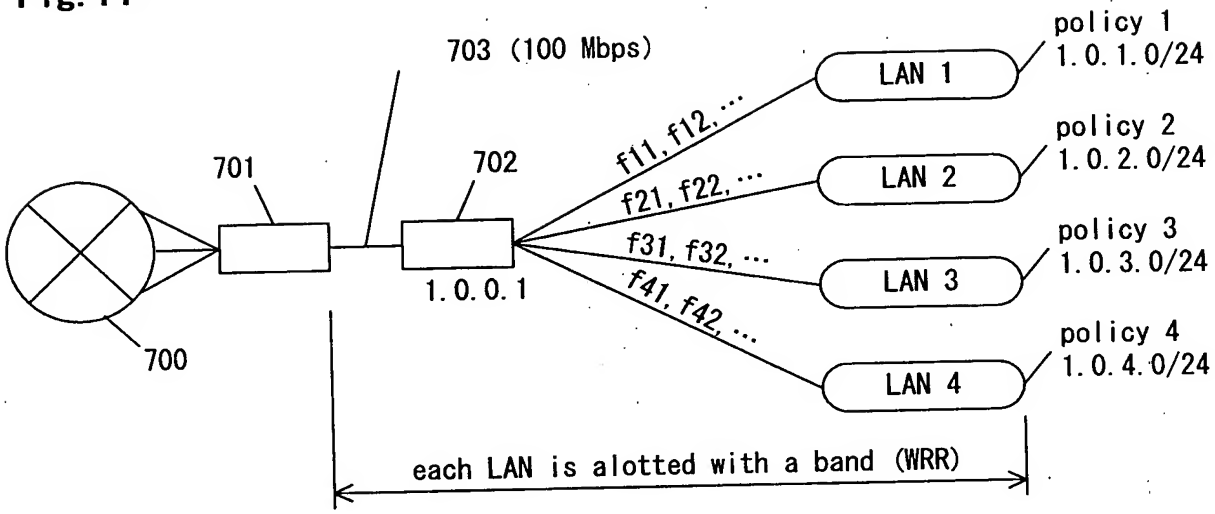

703 (100 Mbps)
701
702
700
1.0.0.1
f11, f12, ...
f21, f22, ...
f31, f32, ...
f41, f42, ...
LAN 1
LAN 2
LAN 3
LAN 4
policy 1
1.0.1.0/24
policy 2
1.0.2.0/24
policy 3
1.0.3.0/24
policy 4
1.0.4.0/24
each LAN is alotted with a band (WRR)

Fig. 15

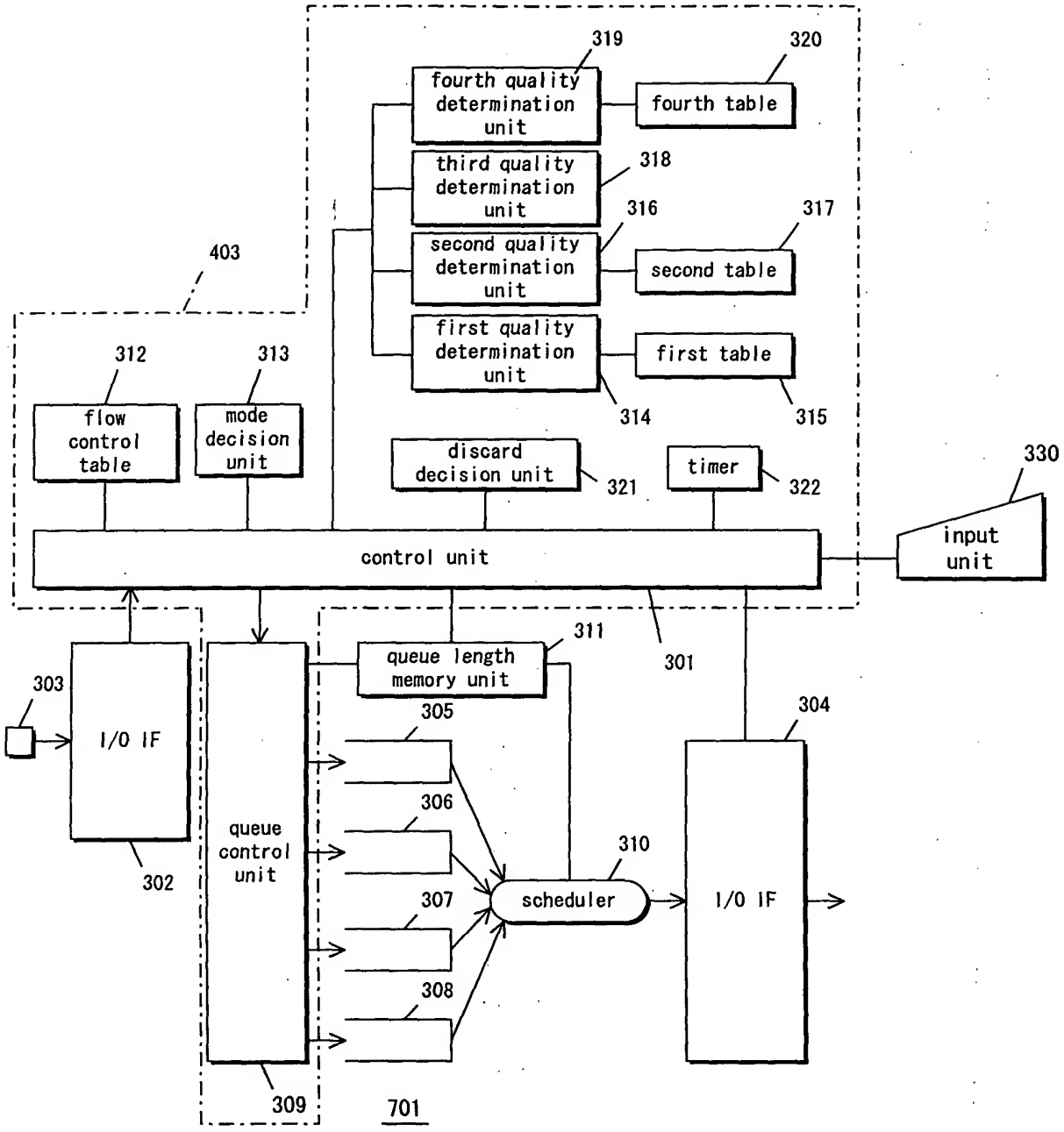

319
320
fourth quality determination unit
fourth table
third quality determination unit
318
316
317
second quality determination unit
second table
403
first quality determination unit
first table
312
313
flow control table
mode decision unit
314
315
discard decision unit
321
timer
322
330
input unit
control unit
301
311
queue length memory unit
303
I/O IF
305
304
306
queue control unit
310
scheduler
I/O IF
307
308
302
309
701

Fig. 16

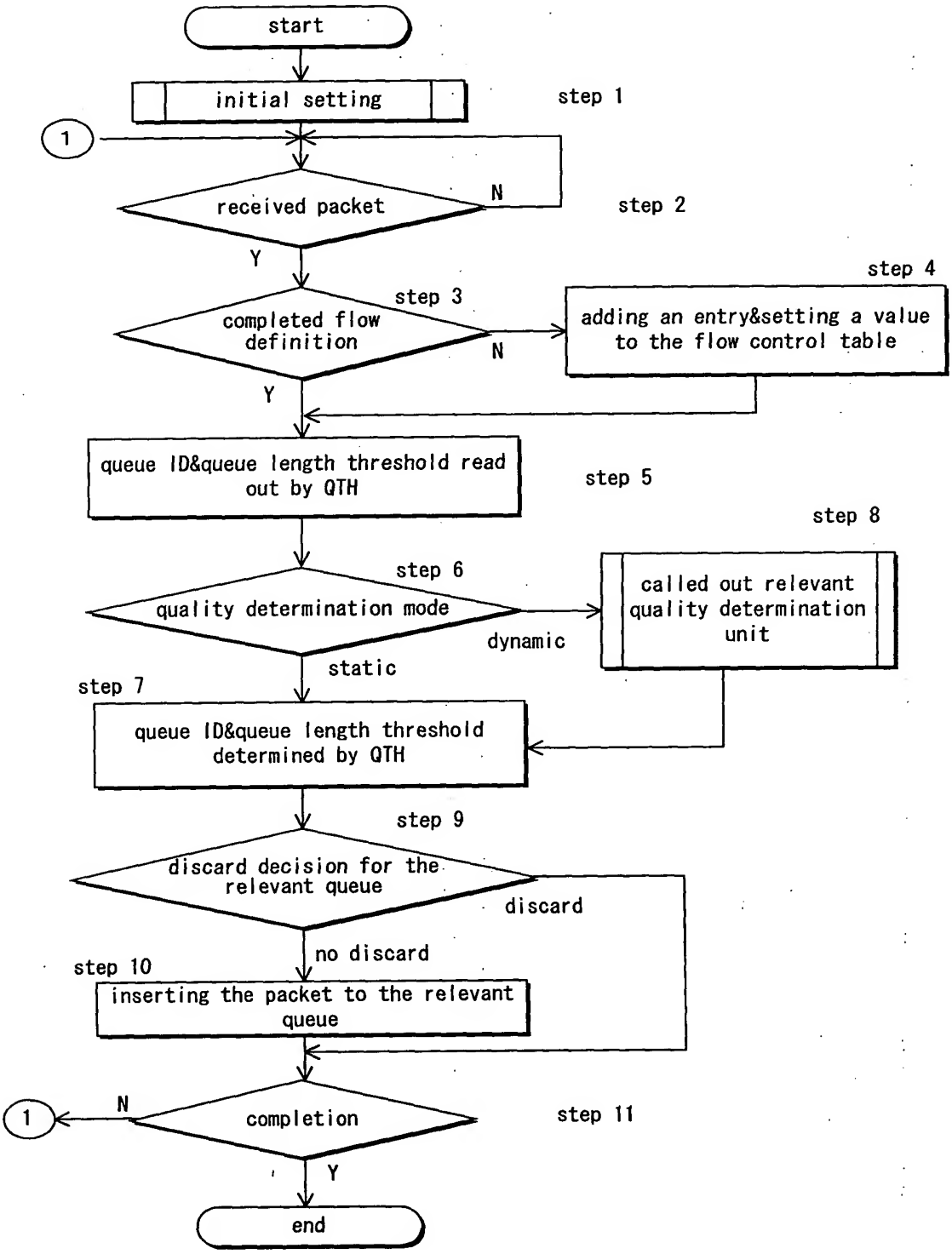

start
initial setting
step 1
1
received packet
N
step 2
Y
step 4
step 3
completed flow definition
adding an entry&setting a value to the flow control table
N
Y
queue ID&queue length threshold read out by QTH
step 5
step 8
step 6
quality determination mode
called out relevant quality determination unit
dynamic
static
step 7
queue ID&queue length threshold determined by QTH
step 9
discard decision for the relevant queue
discard
no discard
step 10
inserting the packet to the relevant queue
1
N
completion
step 11
Y
end

Fig. 17

flow control table　　*: don't care

flow number	header information				property value	
	address		port number		QID	QTH
	sender	receiver	sender	receiver		
1	*	1.0.1.*	30000	*	1	60
2	*	1.0.2.*	30000	*	2	60
3	*	1.0.3.*	30000	*	3	60
4	*	1.0.4.*	30000	*	4	60
5	*	1.0.1.*	80	*	1	0
6	*	1.0.2.*	80	*	2	0
7	*	1.0.3.*	80	*	3	0
8	*	1.0.4.*	80	*	4	0

312

Fig. 18

first table

flow number	QTH	accumulate used amount (bytes)
1	44	980,000,000

Fig. 19

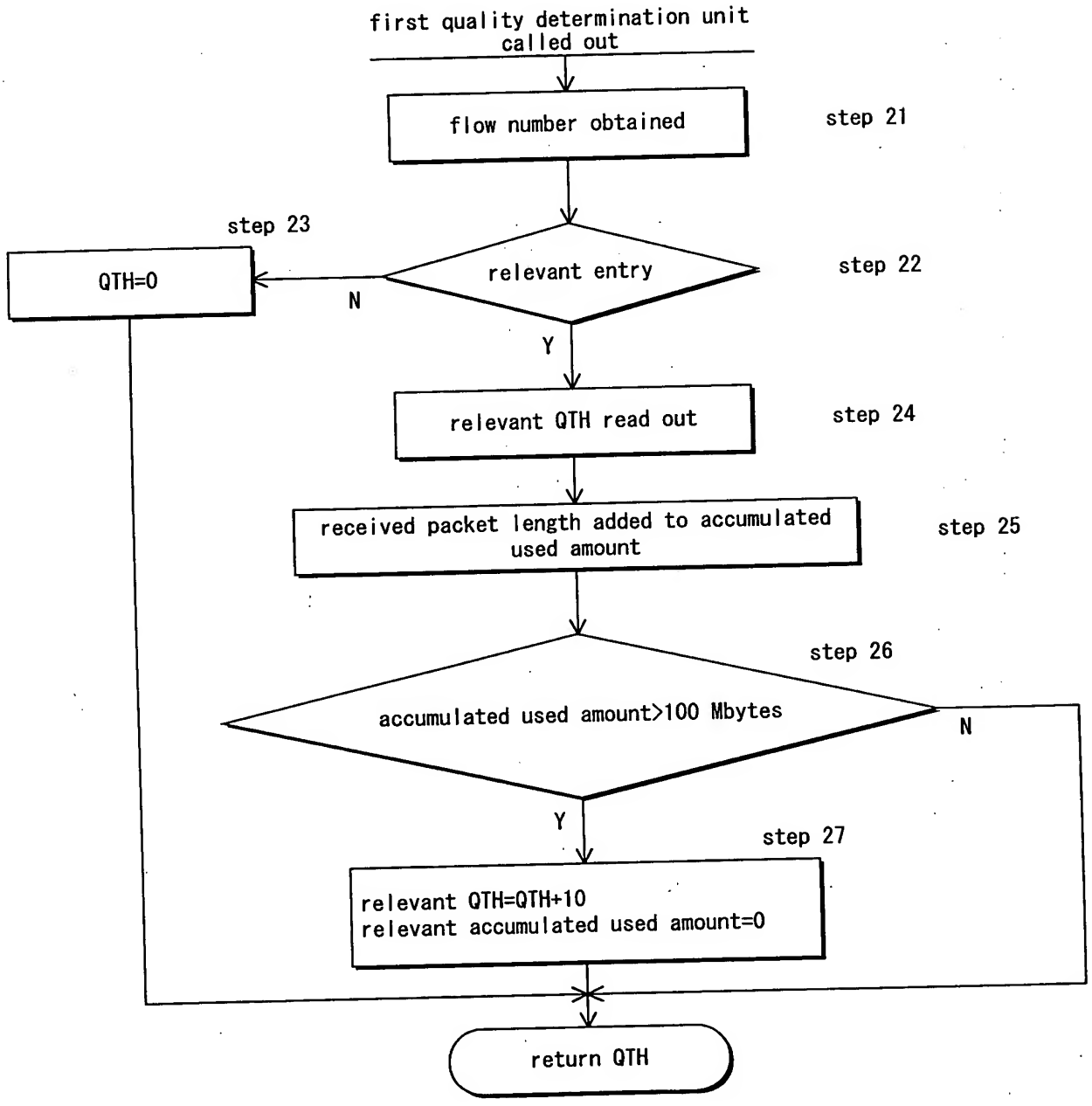


Fig. 20

second table

flow number	QTH	renewal time	final arrival time
2	44	10:49	11:02

Fig. 21

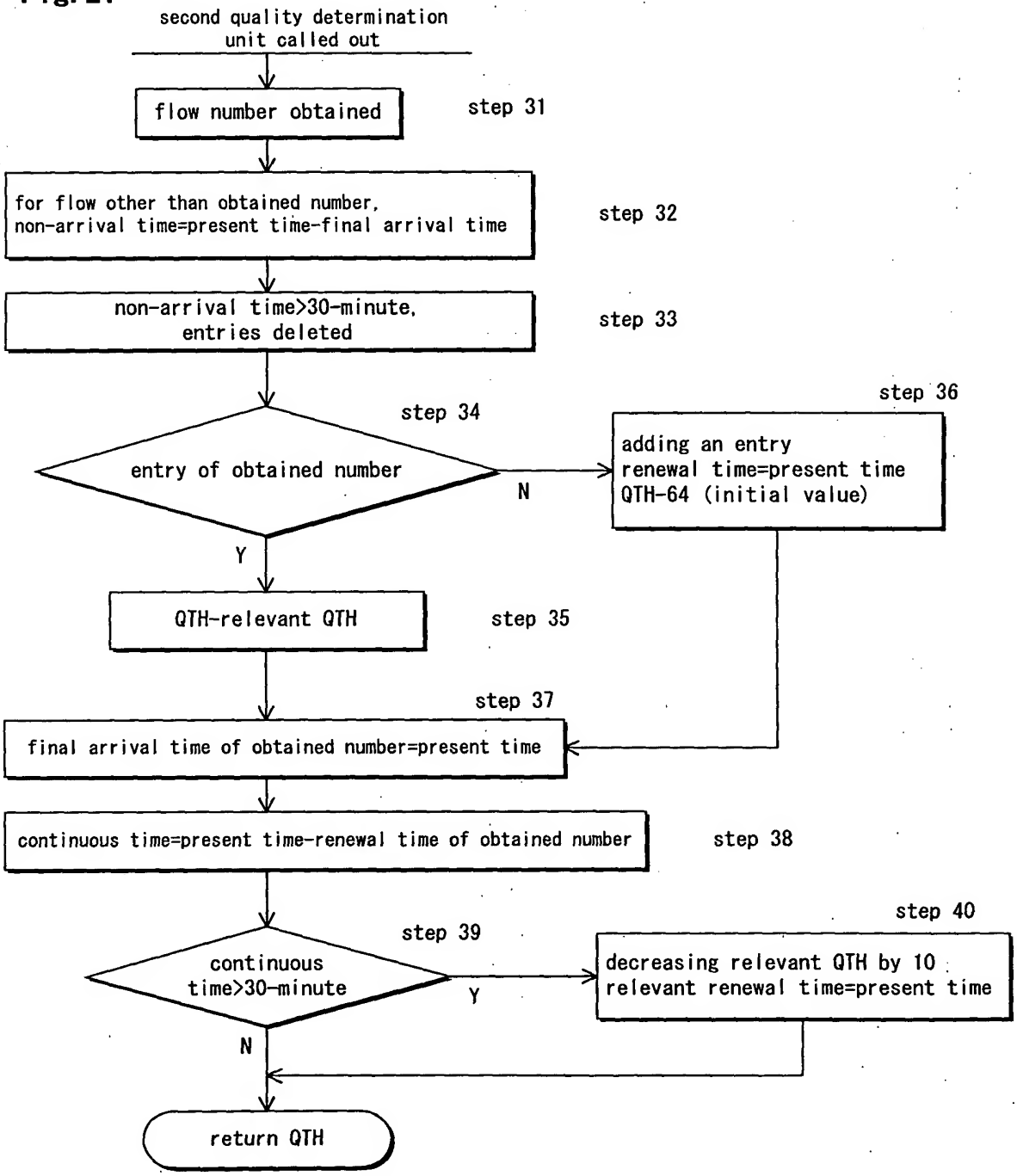
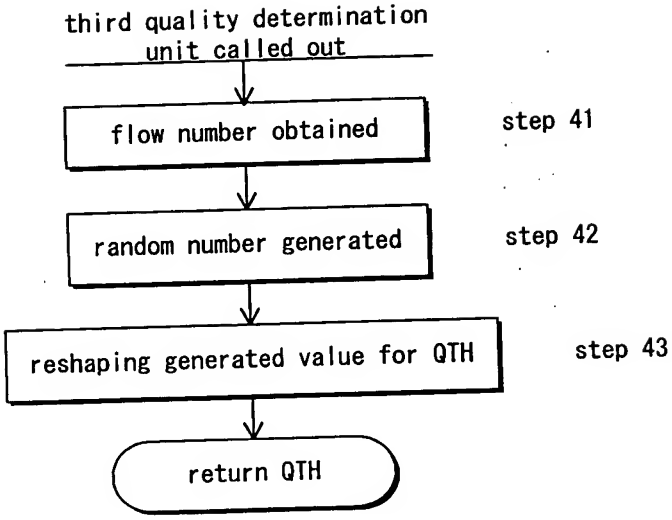


Fig. 22


third quality determination unit called out
flow number obtained
step 41
random number generated
step 42
reshaping generated value for QTH
step 43
return QTH

fourth table

Fig. 23(a)

active flow number AF		0
flow number	QTH	arrival number

Fig. 23(b)

active flow number AF		1
flow number	QTH	arrival number
4	64(initial value)	0

Fig. 23(c)

active flow number AF		63
flow number	QTH	arrival number
4	64	0
8	64	—

Fig. 23(d)

active flow number AF		0
flow number	QTH	arrival number
4	54	0
8	54	—

Fig. 24

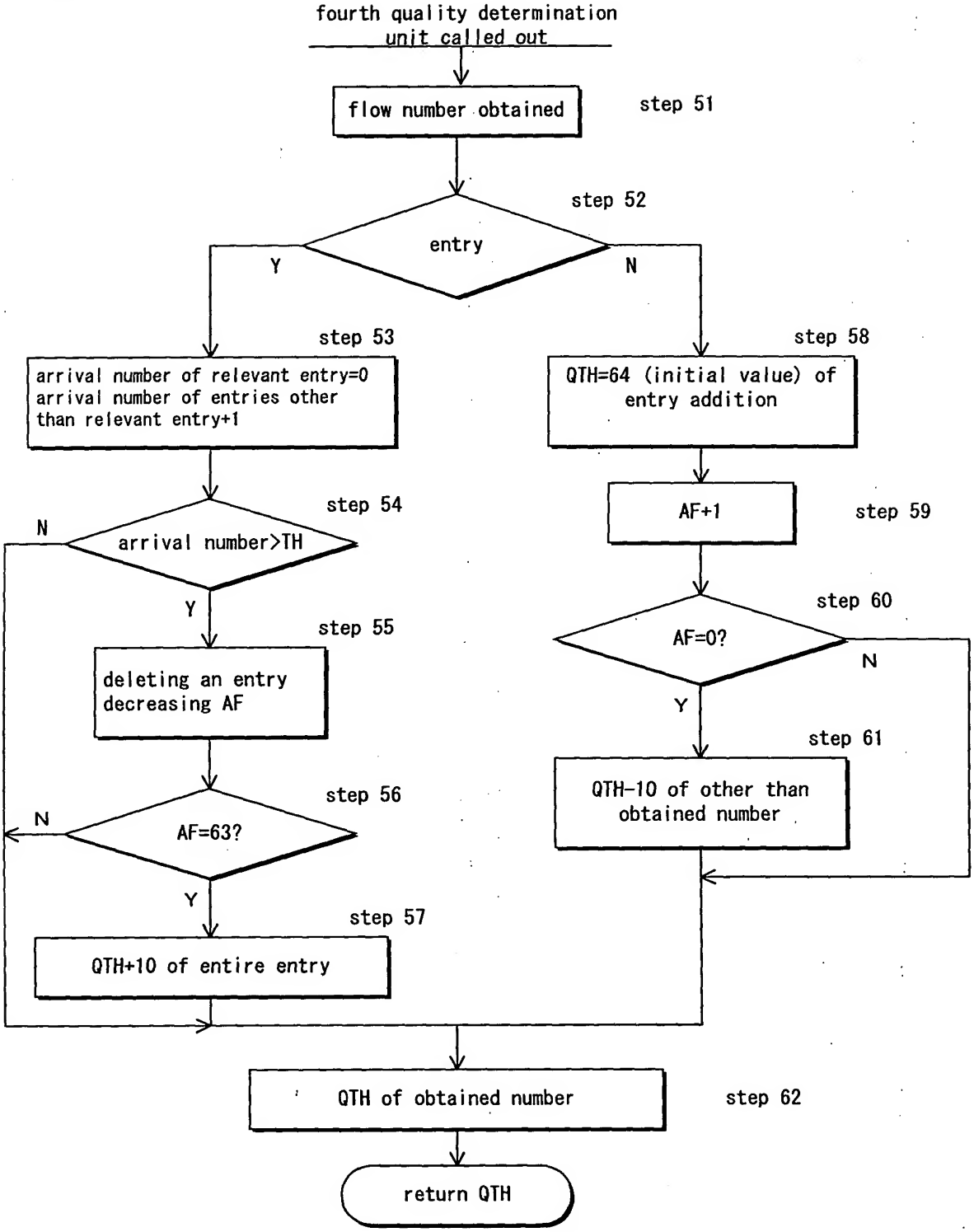

fourth quality determination unit called out
flow number obtained
step 51
step 52
entry
Y
N
step 53
arrival number of relevant entry=0
arrival number of entries other than relevant entry+1
step 58
QTH=64 (initial value) of entry addition
step 54
N
arrival number>TH
AF+1
step 59
Y
step 60
step 55
AF=0?
N
deleting an entry decreasing AF
Y
step 61
QTH-10 of other than obtained number
step 56
N
AF=63?
Y
step 57
QTH+10 of entire entry
QTH of obtained number
step 62
return QTH

Fig. 25(a)

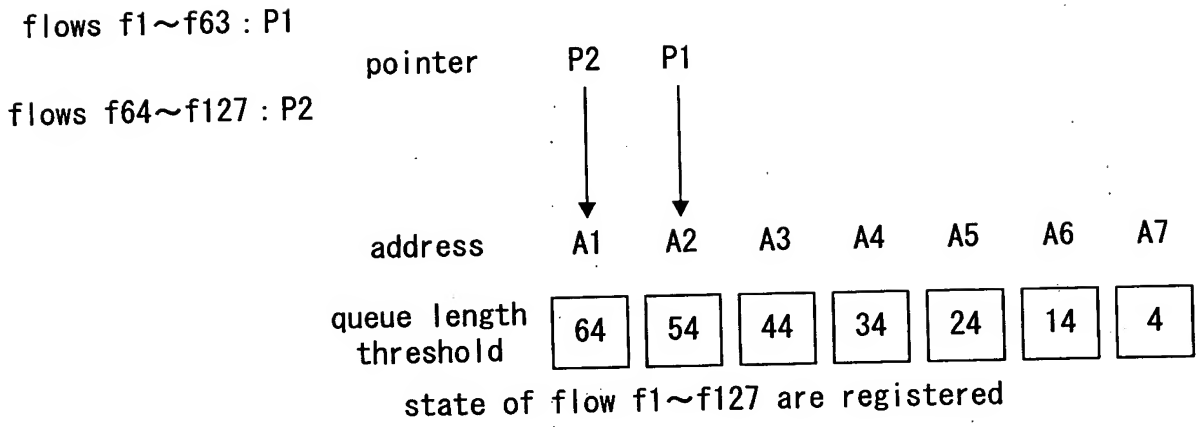


Fig. 25(b)

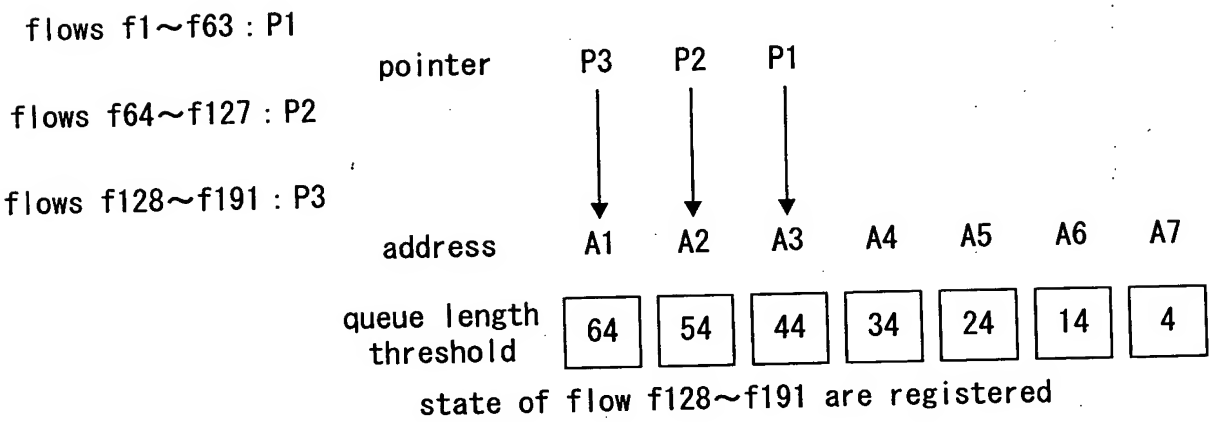


Fig. 26 Prior Art

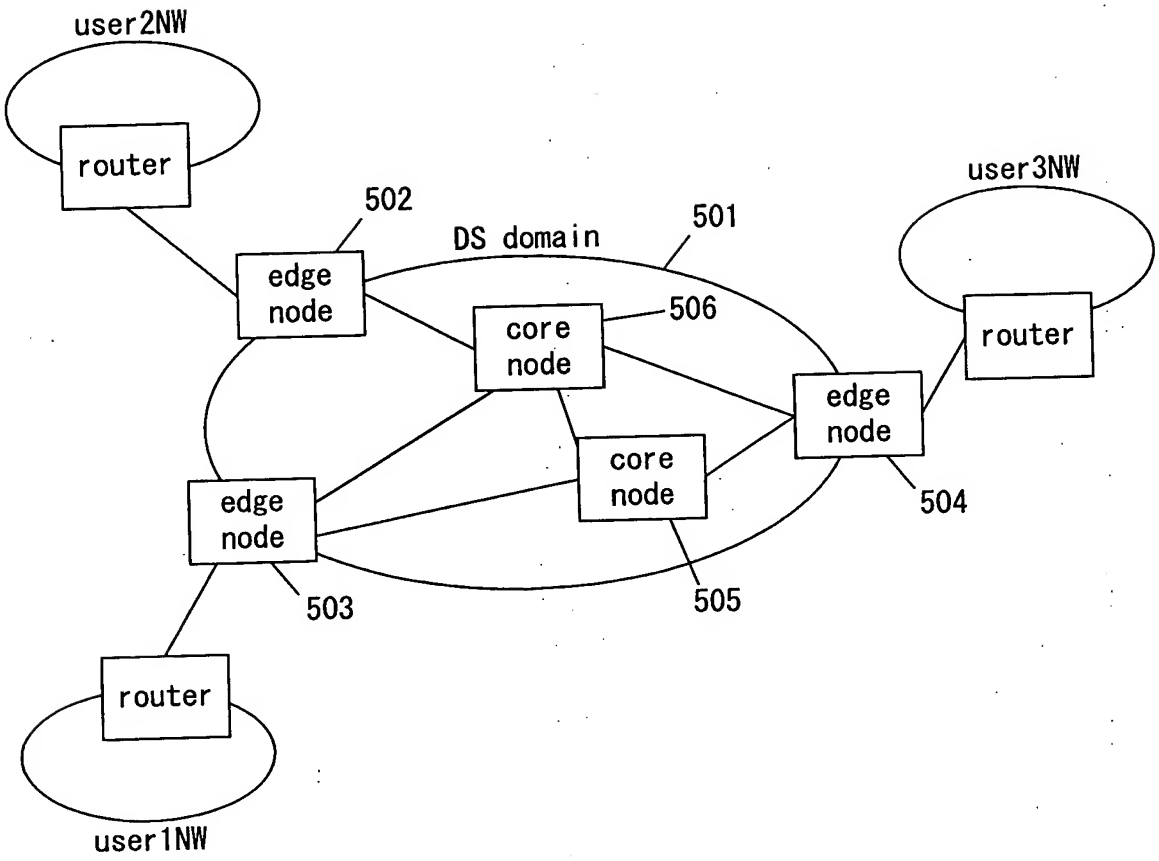


Fig. 27 Prior Art

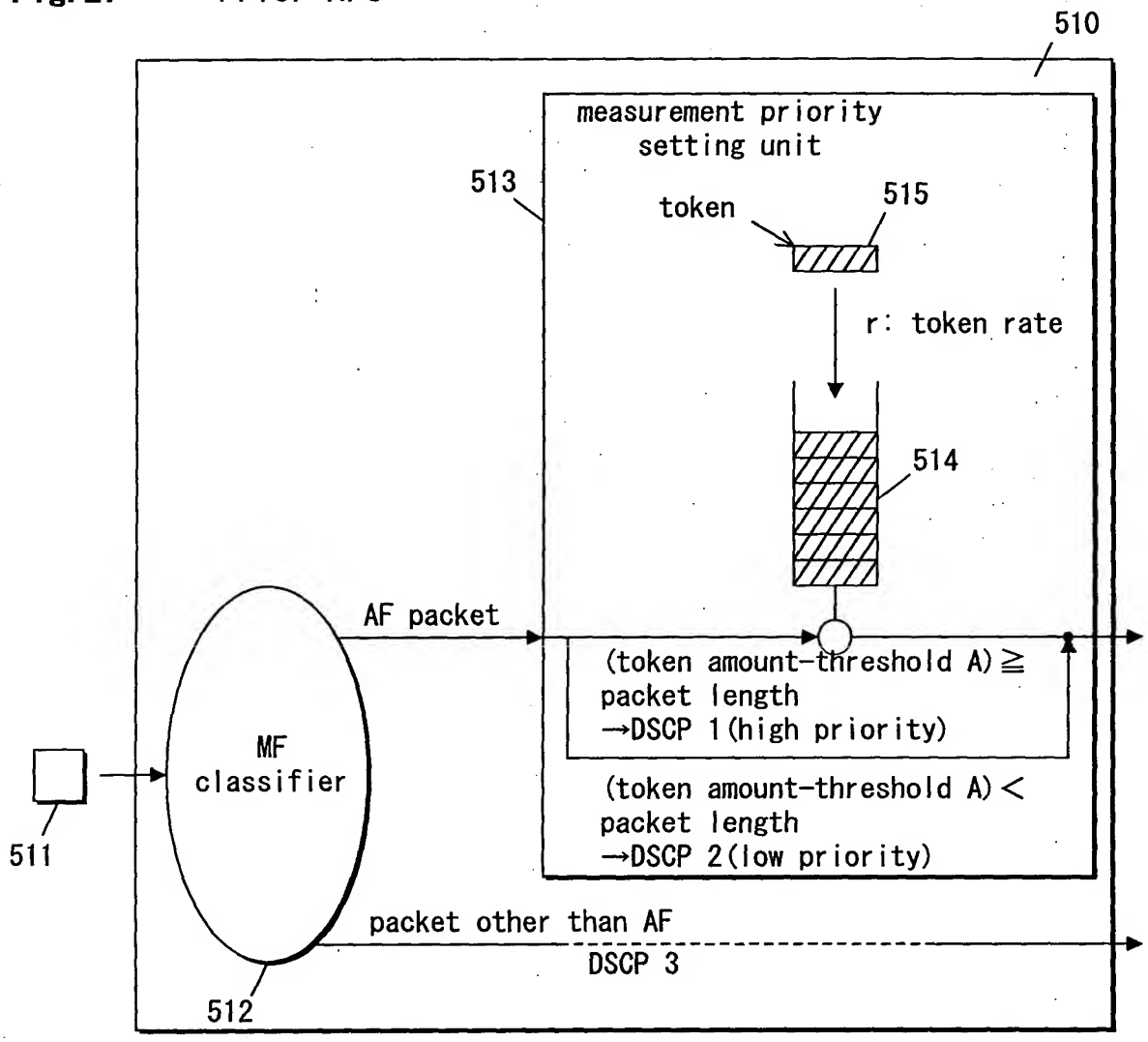


Fig. 28 Prior Art

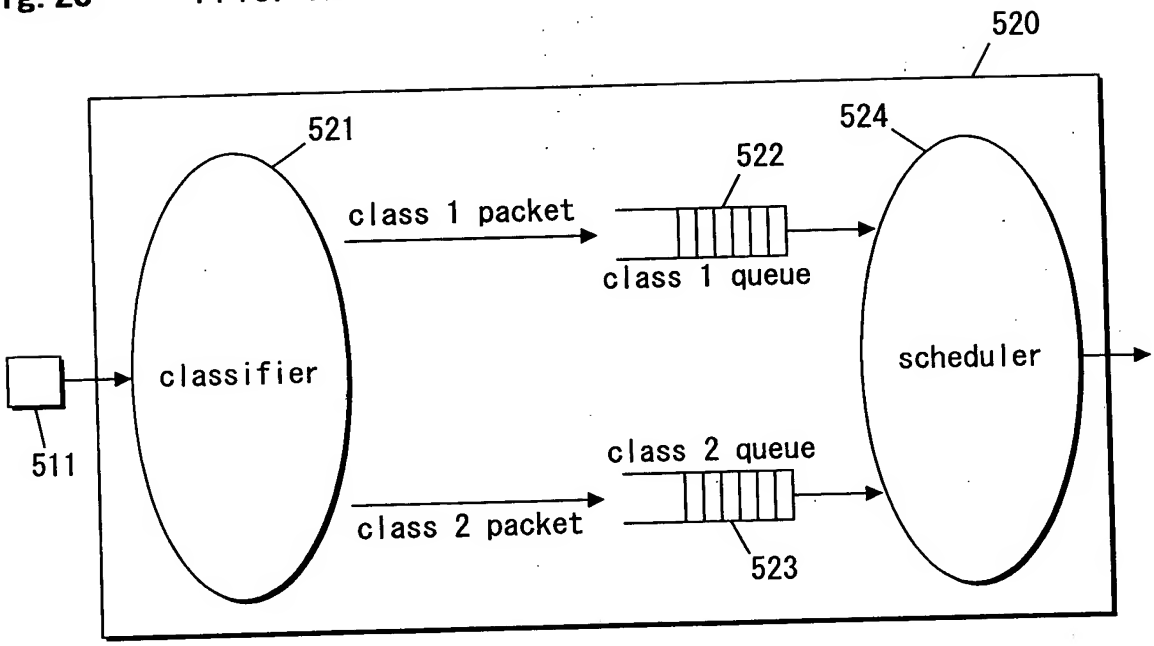


Fig. 29 Prior Art

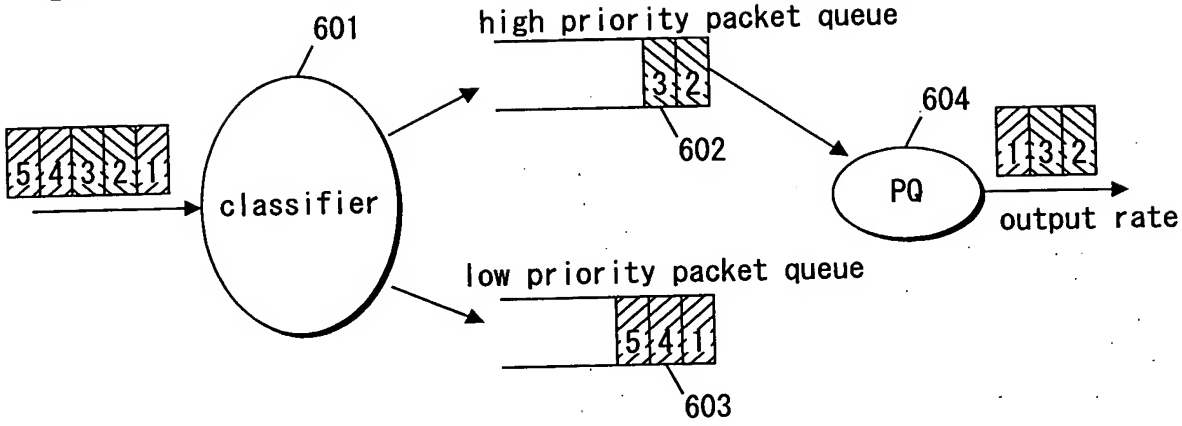


Fig. 30 Prior Art

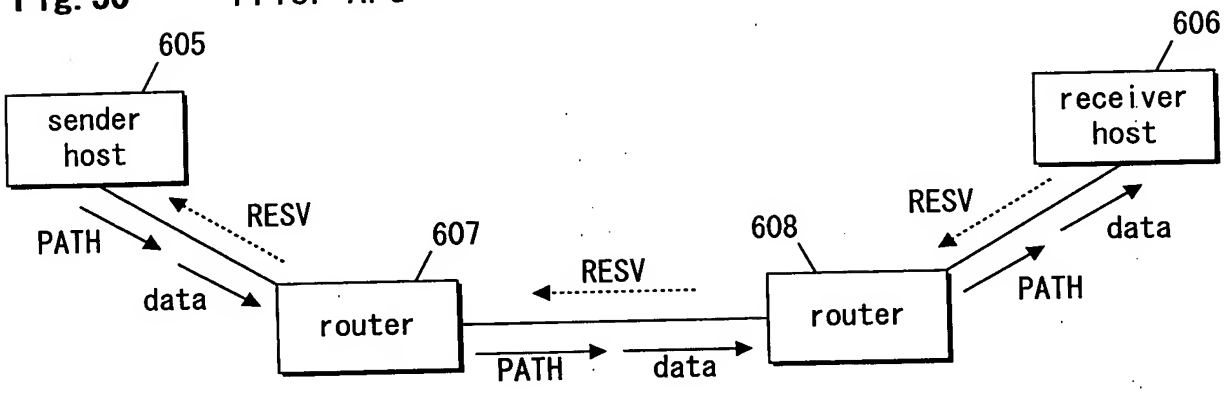
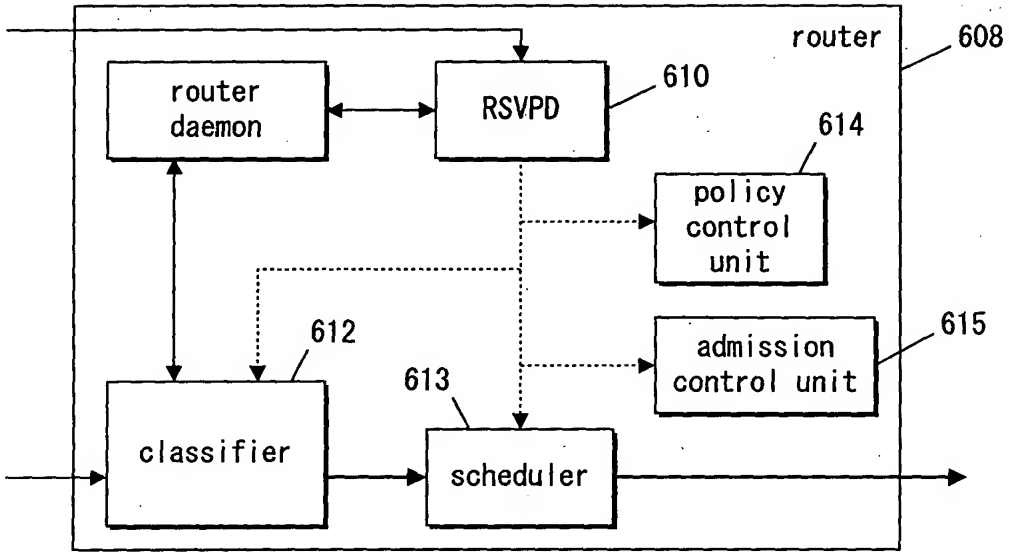



Fig. 31 Prior Art